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ADOPTED

BOSTON
TRANSPORTATION
DEPARTMENT

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June 29, 1989

Mr. Clarence Jones, Chairman
Board of Directors
Boston Redevelopment Authority
Boston City Hall
Boston, MA 02201

Dear Mr. Jones:

Attached is a copy of "A Plan for Transportation in the Midtown Cultural District." As you will see, it contains a discussion of the efforts of the Boston Transportation Department (BTD), in collaboration with the Boston Redevelopment Authority (BRA), to address the Midtown Cultural District's transportation issues in the context of current conditions and the impacts of proposed developments.

In particular, the Plan should help the BRA Board in its review of the three major projects before it today, Commonwealth Center, Boston Crossing and One Lincoln Street. It details short-term actions already taken by the BTD to meet the District's immediate needs, as well as plans to ensure that in the years to come the transportation system supports a redeveloped and thriving Midtown Cultural District.

We would be happy to provide you with any additional information you might need in connection with the Transportation Department's activities.

Sincerely,

Richard A. Dimino
Commissioner

cc: BRA Board
Stephen Coyle

RAYMOND L. FLYNN, MAYOR
RICHARD A. DIMINO, COMMISSIONER

A PLAN FOR TRANSPORTATION IN THE MIDTOWN CULTURAL DISTRICT

PRESENTED TO THE BRA BOARD, JUNE 29, 1989

CITY OF BOSTON
RAYMOND L. FLYNN, *MAYOR*

BOSTON TRANSPORTATION DEPARTMENT
RICHARD A. DIMINO, *COMMISSIONER*

BOSTON REDEVELOPMENT AUTHORITY
STEPHEN COYLE, *DIRECTOR*

Transportation and Development in the Midtown Cultural District

INTRODUCTION

The Midtown Cultural District, in the heart of downtown Boston, is poised to become a center of great development activity. Currently the District comprises the Combat Zone, the Theater District, Downtown Crossing and Park Square. Although the area has historically been the hub of Boston's retail and theater activity, it now contains a high concentration of valuable yet vacant land and underutilized historic buildings. In the near future, an influx of private and public investment will transform the District into a major employment center as well as a home for new theaters, stores, hotels and restaurants.

The area is convenient to the regional highway system, offering access to both Route 93 and Massachusetts Turnpike. Midtown is also well served by public transportation. Three of the four MBTA rapid-transit lines run through the district, commuter rail is a short distance away, and several commuter bus companies have drop-off and pick-up spots strategically located within the District.

The purpose of this report is to describe the efforts of the Boston Transportation Department (BTD), in collaboration with the Boston Redevelopment Authority (BRA), to address the Midtown Cultural District's transportation issues in the context of current conditions and the impacts of proposed developments. It details short-term actions already taken by the BTD to meet the District's immediate needs, as well as plans to ensure that in the years to come the transportation system supports a redeveloped and thriving Midtown Cultural District.

This report reflects a good working relationship between the City of Boston and private developers with an interest in Midtown. This cooperative spirit is evidenced by the Access Plans which developers have submitted for their projects, and upon which much of this report relies for data and analysis.

Midtown Cultural District Plan

The Midtown Cultural District Plan was developed to guide revitalization of this area while protecting its historic character. The plan outlines a balanced program of growth that will create a new downtown community of residences, businesses, and cultural facilities.

To ensure that the area's transportation systems will continue to provide good access to the area, the Boston Transportation Department has undertaken a series of initiatives. These actions, outlined in the Midtown Cultural District Plan, compose a comprehensive strategy that maximizes the use of existing mass transit facilities and proposes a number of measures to improve the area's roadway facilities. The plan recommends the following improvements to the area's transportation systems:

- Create new east/west traffic connections
- Improve subway service
- Implement an expanded signalization program

- o Carefully locate new parking facilities
- o Establish a Transportation Management Association
- o Enforce existing traffic codes.

The MBTA is currently investigating the feasibility of a new underground transit service which would connect the existing Green Line to South Station, via the Midtown Cultural District, and to South Boston. The City of Boston is cooperating in these studies, and taking steps, described below, to help plan the alignment and the service characteristics.

Boston Crossing, Commonwealth Center, and One Lincoln Street, three projects currently in the planning process, will help create momentum for the Midtown Cultural District by establishing a reginal center of commercial, retail, and cultural activity in the heart of the district. All three are located within blocks of each other in the the Midtown Cultural District. While they are sure to generate significant public benefits for the City of Boston, they likewise are sure to generate additional traffic which must be carefully managed.

EXISTING CONDITIONS

Traffic Conditions

Because the Cultural District at present does not generate as many peak-hour automobile trips, on a per-acre basis, as other commercial areas in the downtown and Back Bay, it does not have serious traffic problems. However, the District experiences considerable traffic congestion on the periphery. In addition, local street patterns are confusing, and some areas are not conducive to safe pedestrian movement. Deficiencies in the existing condition result from high volumes of traffic passing through the District, combined with the severe capacity restrictions imposed by the old, narrow and irregular pattern of streets.

The circulation system providing access to the Cultural District (defined here as the area between Tremont St., Stuart/Kneeland, Surface Artery and Summer St., as shown in Figure 1) is indirect and confusing. Traffic penetrates into the area by using Washington, Beach, or Summer Street. To exit, traffic connects with arteries via Harrison, West, Temple, Essex and Kingston Streets. Westbound movements are possible via Stuart/Kneeland and a portion of Boylston between Tremont and Charles. North of Stuart/Kneeland, State Street is the first direct westbound connection between Atlantic Avenue or Surface Artery and Tremont Street. Beach Street is the only direct westbound connection that penetrates as far as Washington Street for internal circulation purposes. Avenue de Lafayette has available capacity for westbound traffic but it is greatly underutilized because it does not have a direct connection with Surface Artery. Traffic is forced to use circuitous routes such as Summer to Kingston to enter or Washington to West to exit Avenue de Lafayette.

The City has identified a total of 8 intersections now operate at a Level of Service (LOS)* of E or F, indicating substandard flow rates and undesirable delays:

* Definitions and descriptions of Level-of-Service ratings are attached in the Appendix.

Dewey Square: F in the AM and PM peak
Tremont/Boylston: F in the PM peak
Surface Artery/Lincoln/Essex St: F in AM and PM peak
Harrison/Beach: E in the PM peak
Essex/Harrison: F in the PM peak
Essex/Kingston/Lafayette: F in the PM peak
Kingston/Bedford: E in the PM peak
Surface Artery/Kneeland: F in the PM peak

In summary, the problems presently affecting the Cultural District's traffic flow involve 1) indirect and circuitous access from the north, south and east and 2) congested intersections and corridors on the periphery, such as the Tremont/Boylston intersection, the Boylston/Essex corridor, the Kneeland/Surface Artery intersection, and the Dewey Square intersection.

This report outlines steps addressing current problems and, in addition, traffic management recommendations which can mitigate the impacts of future development in the Midtown Cultural District.

Public transportation services

Encouraging increased transit use has been the City's goal and is a key to the success of these developments. All three projects have excellent transit access. Three of the four MBTA rapid-transit lines serve the project area directly, each with more than one stop in the District:

- Orange Line at Chinatown and Downtown Crossing
- Red Line at Park Street and Downtown Crossing
- Green Line at Boylston and Park Street.

Although the Blue Line does not serve this area directly, passengers can transfer to the Green Line at Government Center or to the Orange Line at State.

Commuter rail serves North, South, and Back Bay Stations. Passengers destined for these projects can transfer to rapid-transit service at these terminals.

The MBTA also operates a number of local and express bus routes that offer access to these projects.

- Route 3: Chinatown - Boston Marine Industrial Park
- Route 7: City Point - Downtown
- Route 11: Bay View - Downtown
- Route 43: Ruggles - Downtown
- Route 49: Dudley Square - Downtown
- Route 55: Queensberry - Downtown
- Route 300: Riverside - Downtown
- Route 301: Brighton Center - Downtown
- Route 304: Watertown Square - Downtown
- Route 304A: Newton Corner - Downtown
- Route 305: Waltham - Downtown

This area currently enjoys some of the highest transit use in downtown Boston. According to the Central Transportation Planning Staff, about 61 percent of the work trips to the Washington Street area arrive by transit in the peak commute hour. Despite these advantages as well as recent structural improvements to facilities, mass transit ridership to Midtown locations is not keeping pace with the increasing size of Downtown Boston's work force.

ECONOMIC DEVELOPMENT IN THE FUTURE

In the next ten years, the Cultural District will change dramatically. Through proper management, the District has the capacity to absorb seven to eight million square feet of development over the next ten years.

Three projects will lead the way for this carefully managed growth:

> Commonwealth Center, comprising 1.3 million sq.ft. of office space, 106,000 sq.ft. of retail, 400 hotel rooms, and two theaters;
>
> Boston Crossing, which will include a complete redevelopment of the existing Lafayette Place, a new facade for Jordan Marsh, and a new Bloomingdale's department store, as well as another 1.45 million sq.ft. of office;
>
> One Lincoln Place, on the site of the existing delapidated Kingston-Bedford Garage, consisting of approximately 1 million sq.ft. of office and 35,000 ancillary retail sq.ft.

Together, Commonwealth Center, Boston Crossing and One Lincoln St. will generate approximately 74,000 person-trips per day.

Environmental Impact Reports for the three projects (for Commonwealth Center by Sasaki Associates, for Boston Crossing by Bruce Campbell Associates, for One Lincoln Street by Howard/Stein- Hudson) disclose important information about existing conditions, and make projections about future conditions with the projects in place. To arrive at these projections, certain assumptions are made about the behavior of people going to the sites with regard to transit use, ridesharing, etc. These assumptions are one indication of the efforts which must be made by private and public parties to realize the full potential capacity of transit and road systems. They also identify important transportation improvements that are necessary for the successful economic development of the area.

Intersections Studied

The Draft Project Impact Reports prepared by the proponents of the three major projects provide detailed analysis of traffic operations at the following downtown intersections. Intersections studied are listed in Table 1 and shown in Figure 1.

TABLE 1: Study Area Intersections

- Kneeland/Tremont
- Boylston/Charles/Charles South
- Tremont/Park
- Tremont/Temple Place
- Tremont/West
- Tremont/Avery
- Tremont/Boylston
- Tremont/Stuart/Kneeland
- Washington/Stuart
- Washington/LaGrange/Beach
- Washington/Essex
- Washington/Avery/Hayward Place
- Washington/Avenue de Lafayette
- Harrison/Stuart/Kneeland
- Chauncy/Avenue de Lafayette
- Chauncy/Arch/Summer
- Kingston/Otis/Summer
- Surface Artery/Lincoln/Essex
- Washington/West
- Harrison/Chauncy/Essex
- Harrison Extension/Avenue de Lafayette
- Chauncy/Bedford
- Kingston/Avenue de Lafayette/Essex
- Kingston/Bedford
- Columbia/Bedford
- Harrison Extension/Hayward Place
- Summer/High
- Church Green

Midtown Cultural District

Fig.1. Intersections Studied

Background Growth

To project traffic volumes in the Midtown Cultural District, a number of potential projects leading to a full-build scenario were included as background growth (Table 2). Background projects included in the analysis are:

TABLE 2: Background Projects

- 110-120 Tremont Street
- Pavillion at Park Square
- The Parkside Projects
- 90 Tremont Street
- 600 Washington Street
- Parcel R-3/R-3A (Parcels A, B and C)
- 15 New Chardon Street
- 64-74 Franklin Street
- Forty Franklin Street
- 146 Boylston Street
- 73 Tremont Street
- 45 Province Street
- 125 Summer Street
- South Cove Parcel C-2
- Don Bosco
- 295 Devonshire Street
- Post Office Square Garage
- International Place II
- 84 Summer Street
- 99 Summer Street
- 140 Federal Street
- 75 Federal Street
- Boston Edison Substation
- 101 Arch Street
- 80 Bedford Street

The locations of these projects included in background growth are shown in Figure 2.

Fig.2 Background Projects

In addition to background growth assumed as a result of specific development projects, a background growth rate of 0.5 percent per year is assumed due to the moderate growth in traffic generated outside the Midtown Cultural District. Traffic volumes due to Boston Crossing, One Lincoln Street and Commonwealth Center were then combined with 1995 No Build volumes, and 1995 Build traffic volumes were determined.

Roadway Networks

Traffic analysis for this plan assumes that the City and State will implement certain traffic circulation changes when the three proposed projects are completed. Those changes include the reversal of Avery Street and Hayward Place, and the widening of Essex Street between Surface Artery and Kingston Street, providing a westbound link between Surface Artery and Avenue de Lafayette. In order to demonstrate the traffic circulation impacts/benefits of the Essex Street widening, the Boston Transportation Department examined the relative conditions at major intersections in future scenarios with and without the widening.

Impacts of Boston Crossing, One Lincoln Street and Commonwealth Center

Level of Service ("LOS") analyses were performed at all study area intersections using the future Build peak-hour traffic volumes, which incorporate traffic volumes caused by background growth. The City of Boston Transportation Department is currently computerizing and connecting downtown traffic signals to ensure the most efficient progression through signalized intersections and to minimize delays. Therefore, to simulate future conditions, signal timing was optimized so as to cause even delays for all approaches.

The EIR's for the three projects assume that transit use among their tenant employees, shoppers, residents and visitors will be higher than currently pertains in the area. Compared with the area's present 61%, Boston Crossing assumes a 65 percent transit share and 5 percent walk share for all project-related work trips. Commonwealth Center did not separate work and non-work trip but assumed that 65.5 percent of person trips associated with office use would use transit and 5.2 percent would walk. Kingston-Bedford-Essex assumes a 60 percent transit share and 10 percent walk share for all work trips. Taken together, these projects would add about 4500 daily trips to the MBTA system during the p.m. peak period in the peak direction. These riders would be distributed throughout the MBTA system over the course of the peak hour.

Likewise, the EIR's assumed higher levels of ridesharing for the proposed projects than those that currently pertain in existing buildings in the district. Commonwealth Center and One Lincoln Street project an average of 1.8 passengers per vehicle among office workers, while Boston Crossing projects an average of 1.6. The average vehicle-occupancy level for home based work trips in the Cultural District at present is estimated at 1.2.

Intersections that Improve in the Build Condition

Due to the proposed reversal of Avery Street and Hayward Place, the Tremont Street intersections with Temple Place and West Street improve marginally.

In addition, through the cooperation of and coordination between the Boston Crossing and Commonwealth Center project proponents, the geometrics and lane configuration of the Washington, Hayward, and Avery Street intersection will improve significantly.

Intersections Negatively Affected in the Build Condition

The intersections which are impacted by traffic from Boston Crossing and Commonwealth Center are shown in Table 3.

TABLE 3: Intersections with LOS Deficiencies
Existing Roadway Network

- Tremont/Boylston
- Washington/Essex/Boylston
- Harrison/Kneeland
- Surface Artery/Essex/Lincoln
- Harrison Extension/Essex
- Harrison/Beach
- Harrison Extension/Avenue de Lafayette
- Chauncy/Bedford/Garage
- Kingston/Avenue de Lafayette/Essex
- Kingston/Bedford
- Surface Artery/Kneeland
- Church Green - Dewey Square

TRANSPORTATION IMPROVEMENTS

The development proposed for the Cultural District promises to revitalize a once-depressed area and provide a location for thousands of new jobs. The Cultural District Plan, however, is more than a plan for new buildings. The BRA and the Transportation Department are committed to the concept of capacity-based planning. It is clear that development must go hand-in-hand with transportation facility and service improvements. In order for the Cultural District concept to prove economically, environmentally and culturally viable, a number of improvements must be made to the transportation system.

Transit. It is apparent that achieving a successful transit share depends upon the MBTA's ability to increase capacity. Capacity for more than 4500 peak-hour trips in the next five years will be necessary to accomodate new demand.

Some projects have already been completed. For example, the MBTA has extended platforms on the Red and Orange Lines to accomodate six-car trains, and recently completed track and signal improvements should improve reliability and efficiency.

Other improvements to capacity and reliability will continue to be made by the MBTA. These include acquiring additional rolling stock, extending Blue Line platforms, and increasing parking at outlying transit stations. Long-term, major service expansions include the Old Colony Railroad restoration and the provision of subway service to the South Boston area.

In many cases, the MBTA may have sufficient capacity to meet demand. However, when operational problems lead to service delays and "bunching," the practical capacity is constrained. Discussions between the BTD and the MBTA are addressing these problems.

In addition, developers have shown their commitment to encouraging project employees to choose transit for their work trip. Mitigation packages include institution of transit pass sales programs and direct subsidy of transit use by employees at the projects. In addition, direct connection from the proposed projects to subway stations will make the MBTA system more attractive to all workers, visitors and shoppers at the developments.

As mentioned earlier, the MBTA has explored the possibility of extending service through the Midtown Cultural District. By connecting Boylston with South Station, this project could provide additional transit capacity to this area. At present the MBTA is examining an alignment under Boylston/Essex Street for the service. In addition, the BTD, the BRA and developers are working to preserve a second option of a Hayward Place alignment.

Parking Management. The three projects propose parking garages with capacities totalling between 2400 and 2900 spaces. At present there are 1361 spaces on the three sites which will be replaced by the developments. Any net increase in the number of spaces on each site, however, will have to be approved by the Transportation Department and the Air Pollution Control Commission. The appropriate number of spaces for each project must take into account both the number of additional vehicle-trips generated and marketing factors for these buildings. The ultimate determination of parking supply must be consistent with 1) the capacity of the street system to handle the cars going to and from the projects, 2) the number of spaces available in the Boston parking freeze bank, and 3) the project's transit-use and vehicle-occupancy goals.

Commuter Mobility patterns. A critical element of the strategy for preserving and improving access to all commercial areas in the 1990's will be Commuter Mobility programs. The project sponsors need to work with the City to engage in an agressive and coordinated Commuter Mobility Program in order to make travel options available to commuters and to market carpooling and vanpooling. The program would include designaton of transportation coordinators responsible for executing the program. Incentives such as reserved carpool and vanpool spaces at discount rates, and dis-incentives such as parking rates that discourage long-term parking, need to be an integral part of the program. Encouragement of flexible hours can also be effective. Flex-time policies on the part of employers allow commuters to travel outside the rush hour, spreading peak loads on arterials.

Transportation Management Association. The developers should also investigate and devise a plan for a Transportation Management Association, which will organize District-wide efforts to decrease reliance on single-occupant vehicles through education, promotion and development of commuter data bases. Such an approach, addressing district transportation problems through a consortium of private interests, has proved successful

nationwide. Local examples include the efforts of the institutions in the Longwood Medical Area, where MASCO shuttle buses supplement the services provided by the MBTA and an area-wide data base increases the effectiveness of rideshare programs. An element of the MASCO program which is particularly promising for the Midtown Cultural District is the use of shuttles to serve peripheral and off-site parking lots.

Traffic Relief Program. In order for the Boylston-Essex and Stuart/Kneeland corridors to carry the traffic which new development will put on them, their capacities will need to be maximized. The BTD has plans to institute Traffic Relief Programs on these streets, which will restrict parking during peak hours and provide for strict enforcement of regulations.

The Traffic Relief Program (TRP), a program currently implemented by the BTD on Congress, Arlington, and Tremont Streets, serves as a model of effective traffic flow improvement on arterial streets in the Midtown area.

An effective area for the application of this program would be the Boylston/Essex and Stuart/Kneeland Street corridors, which experiences poor levels of service in the 1995 Build condition. The stretch of road on Boylston Street/Essex Street between Arlington Street and Surface Artery could become part of the City of Boston's TRP and be classified as a major trip route.

The application of the TRP to the Boylston/Essex and Stuart/Kneeland corridors would:

- reduce vehicular travel time along this route significantly;
- increase the capacity of existing intersections;
- eliminate vehicular blockage of intersections;
- eliminate double parking.

Under the TRP, the following actions would be undertaken:

- No Stopping Zones would be established along portions of Boylston Street and Essex Street from 7:00-9:30 A.M. and 4:00-6:00 P.M.;

- Parking meters would be removed or added where necessary; taxi stands would be relocated as needed; No Stopping zones would be established on some intersecting side streets to improve flow and increase capacity;

- The BTD, in cooperation with the Boston Police Department, would apply stricter enforcement of regulations during the peak periods.

Signalization. In order to alleviate traffic congestion, the following Cultural District intersections, which are now controlled by stop signs, need to be signalized: Kingston/Bedford, Chauncy/Bedford, Phillips Square and Kingston/Essex.

Modification of Traffic Signal Phases. The modification of signal phases can, in some cases, improve deficient intersection performance to acceptable levels. The elimination of exclusive pedestrian phases at signalized intersections and incorporation of concurrent pedestrian phasing can also reduce delay.

Geometric Improvements. As mentioned above, geometric improvements are planned for the intersection of Hayward, Avery and Washington Streets. Also, improvements will be made to ease traffic flow at the intersection of Tremont and Boylston Streets.

IMPROVED PERFORMANCE OF INTERSECTIONS WITH MITIGATION

Tremont/Boylston. Without mitigation, this intersection will operate at an unacceptable level of service during the peak periods. Contributing to the poor level of service are high traffic volumes, high pedestrian volumes, an exclusive pedestrian phase during the peak hours, double parking on Boylston Street, and occasional parking on Tremont Street.

Design improvements, involving the removal of parking at the Boylston Street approach, are currently being evaluated by the Transporation Department. Re-design would increase the capacity of the intersection and alleviate conflicts between pedestrian and vehicular traffic.

Intersections along Boylston Street and Essex Street east of Tremont Street will improve with the TRP and signal coordination allowing better progression on Boylston Street/Essex Street. Currently, traffic arrives at the signals on Essex Street randomly and is widely dispersed throughout the red and green phases. This usually occurs at isolated intersections or at signalized intersections that are not coordinated with other nearby signals. Coordination of signals on a major trip route would allow dense platoons to arrive during the middle of the green phase or a dispersed platoon to arrive throughout the green phase.

Washington/Boylston/Essex. This intersection will be improved by providing TRP measures and traffic signal coordination. Other improvements include new pavement markings (arrows and legends) to guide motorists. With these improvements traffic operations will improve over those projected for future No Build conditions.

Harrison Extension/Essex. This intersection experiences poor levels of service (LOS E or F) for all future conditions on the Harrison Avenue Extension approach. The proposed mitigation includes signalization, TRP measures (peak parking restrictions, etc.) and signal coordination on Essex Street. The conceptual layout includes one left turn and one through lane on the Harrison Avenue Extension approach and three lanes (one right turn and two through/left turn lanes) on the Essex Street approach. This intersection will operate at acceptable levels of service (LOS C or better) for all future conditions with the proposed mitigation.

Kingston/Avenue de Lafayette/Essex. For the existing roadway network this intersection requires signalization once all other area development is completed. Level of service analysis indicates that with coordinated signals this intersection will operate at LOS D or better for all future conditions.

Surface Artery/Lincoln/Essex. Slight improvements in operating conditions at the Surface Artery/Lincoln/Essex intersection will be achieved for the future Build condition with coordinated signals. To operate at acceptable levels of service, however, requires further mitigation. A preliminary design has been developed that will allow this intersection to operate at LOS E or better for the future Build condition. See Figures 3 and 4.

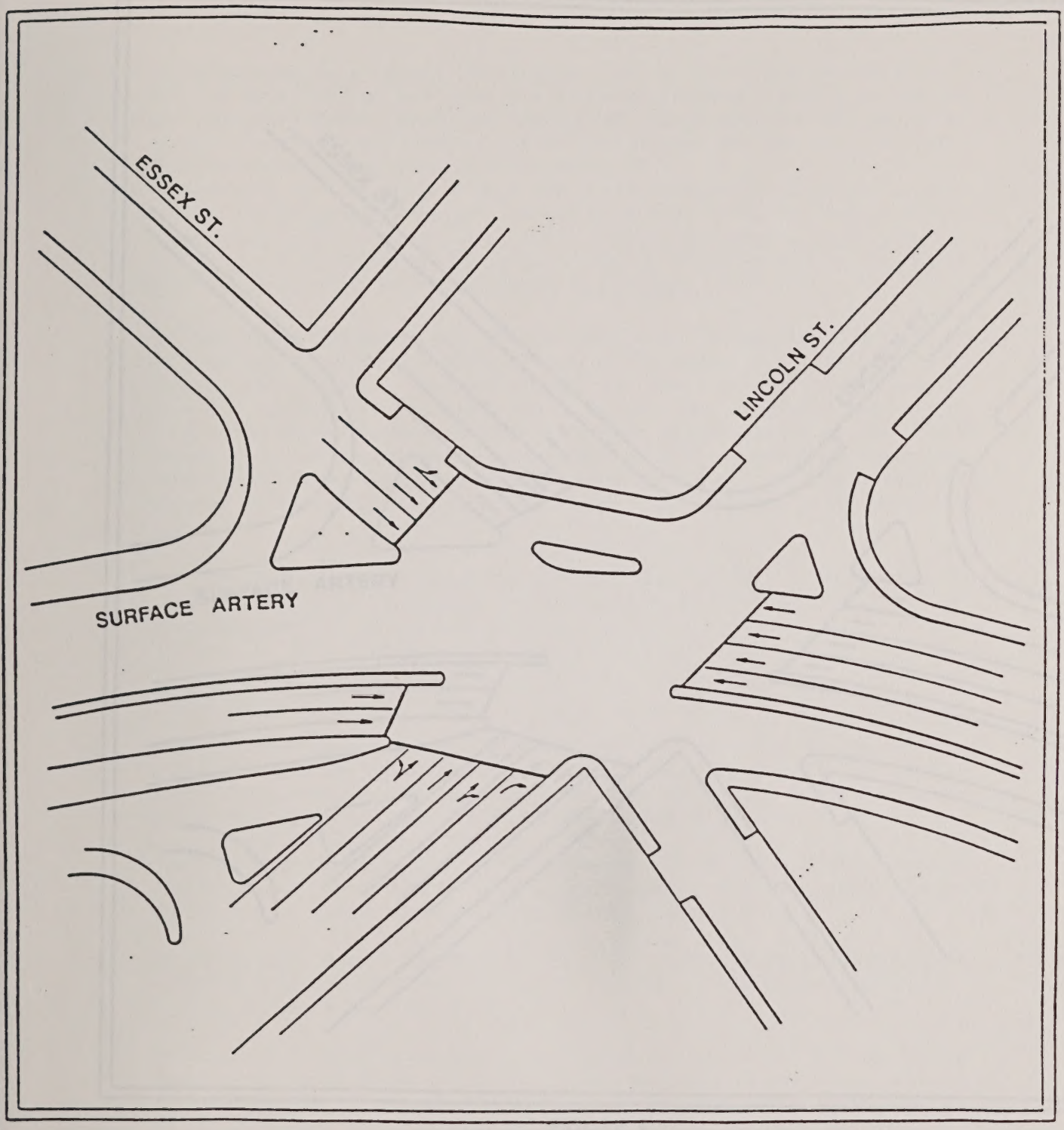

FIGURE 3
PROPOSED IMPROVEMENTS AT SURFACE ARTERY / LINCOLN STREET / ESSEX STREET,
ONE WAY ESSEX STREET

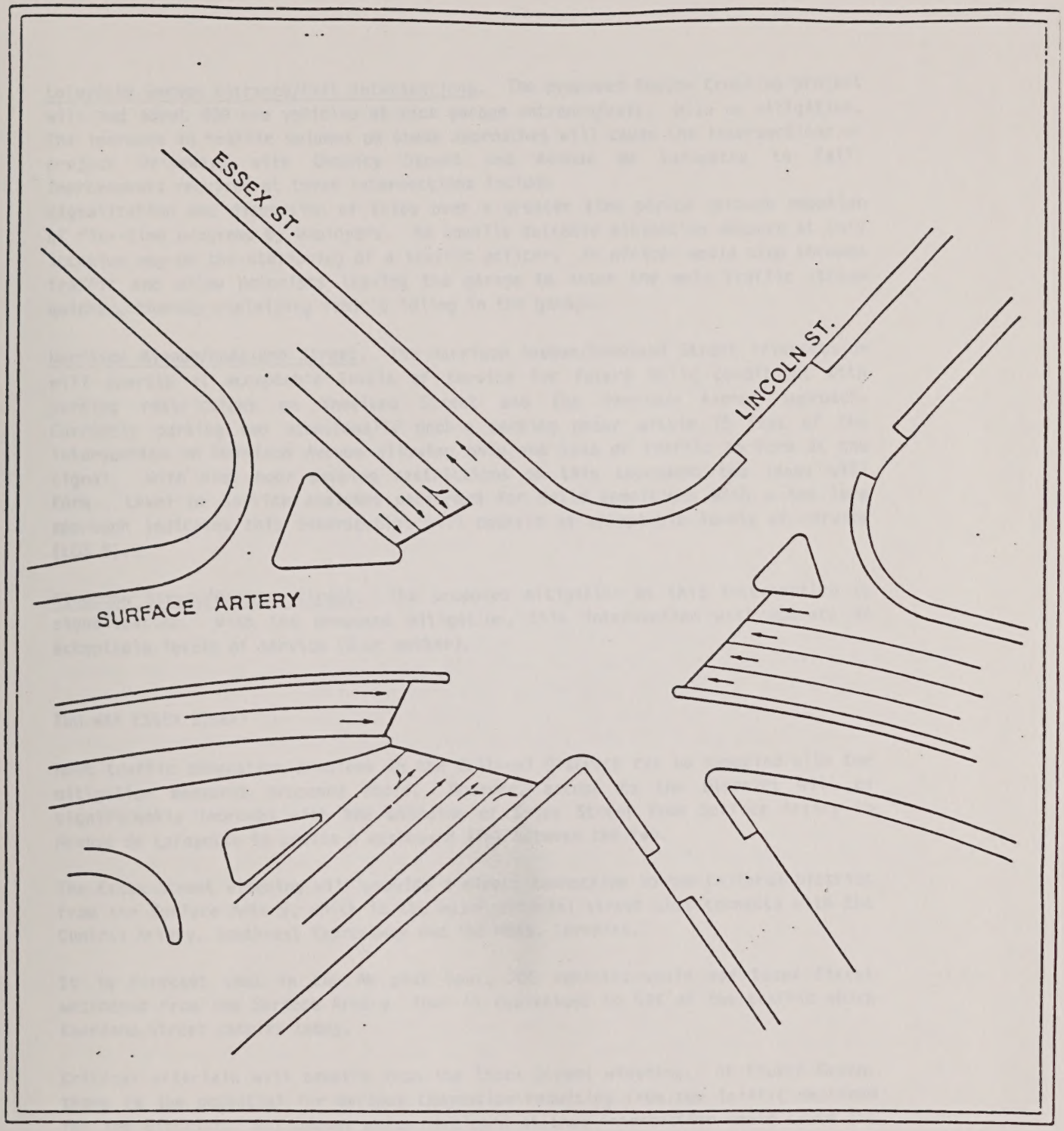

FIGURE 4
PROPOSED IMPROVEMENTS AT SURFACE ARTERY / LINCOLN STREET / ESSEX STREET, TWO WAY ESSEX STREET

Lafayette Garage Entrance/Exit Intersections. The proposed Boston Crossing project will add about 400 new vehicles at each garage entrance/exit. With no mitigation, The increase in traffic volumes on these approaches will cause the intersections of project driveways with Chauncy Street and Avenue de Lafayette to fail. Improvements required at these intersections include
signalization and dispersion of trips over a greater time period through adoption of flex-time programs by employers. An equally suitable mitigation measure at this location may be the stationing of a traffic officer. An officer would stop through traffic and allow motorists leaving the garage to enter the main traffic stream quicker, thereby minimizing vehicle idling in the garage.

Harrison Avenue/Kneeland Street. The Harrison Avenue/Kneeland Street intersection will operate at acceptable levels of service for future Build conditions with parking restrictions on Kneeland Street and the Harrison Avenue approach. Currently parking and occasionally double parking occur within 75 feet of the intersection on Harrison Avenue allowing only one lane of traffic to form at the signal. With peak hour parking restrictions on this approach, two lanes will form. Level of service analyses performed for Build conditions with a two lane approach indicates this intersection will operate at acceptable levels of service (LOS B).

Kingston Street/Bedford Street. The proposed mitigation at this intersection is signalization. With the proposed mitigation, this intersection will operate at acceptable levels of service (D or better).

TWO-WAY ESSEX STREET

Most traffic congestion problems in the Cultural District can be remedied with the mitigation measures proposed above. However, access to the District will be significantly improved with the widening of Essex Street from Surface Artery to Avenue de Lafayette to create a westbound link between the two.

The Essex Street widening will provide a direct connection to the Cultural District from the Surface Artery, which is the major arterial street that connects with the Central Artery, Southeast Expressway and the Mass. Turnpike.

It is forecast that in the AM peak hour, 705 vehicles would use Essex Street westbound from the Surface Artery That is equivalent to 93% of the traffic which Kneeland Street carries today.

Critical arterials will benefit from the Essex Street widening. At Church Green, there is the potential for serious congestion resulting from new traffic destined for the District. Any queues which developed at that intersection would cause the further disruption of nearby Dewey Square. Westbound volumes on Summer Sreet west of High Street would decrease with the widening from 827 to 580, greatly alleviating queuing into Dewey Square, and improving the Level of Service of the Church Green intersection from F to C.

A summary of the effects of the Essex Street widening on AM peak-hour Levels-of-Service at various intersections is presented below.

Intersection	Without Widening	With Widening
Washington/Essex/Boylston	F	E
Harrison/Stuart/Kneeland	C/D	B
Summer/Bedford/Lincoln	F	C/D
Lincoln/Essex/Surface Artery	E	D
Kneeland/Surface Artery	F	F

The widening of Essex Street will be a great advantage to the development of the Midtown Cultural District. In addition, it will help to keep traffic out of the Chinatown residential neighborhood, by accomodating trips which today use Beach Street. It will also improve access to the Financial District, by improving conditions in Dewey Square and Church Green.

Funding the Essex Street Widening. In order to accomplish the creation of westbound access to the Cultural District via Essex Street, funding for both property acquisition and roadway construction needs to be sought. Construction funding has been secured under Federal-Aid Urban Systems programs; the project is already listed on the State Transportation Improvement Program for the Boston region. The BTD and BRA are pursuing a funding mechanism based upon a public-private partnership which will leverage funds from a variety of sources to achieve the land taking.

BRA AND TRANSPORTATION DEPARTMENT REVIEW PROCESS

The actions that the BRA Board is considering today with regard to the Commonwealth Center, Boston Crossing and One Lincoln Street projects are significant to the realization of those projects. However, these actions do not constitute final approvals.

BRA Board Actions. Actions considered by the BRA Board today are conditioned upon the issuance of an Adequacy Determination. If the Zoning Commission and the Zoning Board Appeal concur, the BRA Board's approval would determine the maximum size to which the proponents would be allowed to build. The number of parking spaces the proponents will finally be allowed will be determined through the Boston Air Pollution Control Commission, for commercial spaces, and the City's environmental review process, for private (freeze-exempt) spaces.

Environmental Review Process. The City of Boston and the BRA will continue to review the projects with regard to the environmental impacts of the projects, as mandated by Article 31 of the Boston Zoning Code.

The Boston Crossing, Commonwealth Center, and One Lincoln Street projects are all at a similar stage in the City environmental review process. As a next step, the BRA and the BTD will examine the impacts of the three projects through Final Project Impact Reports submitted by the proponents of each project. If, in

the opinion of the BRA and the BTD, the impacts of these proposed projects have been accurately represented and the mitigation plans are sufficient, the BRA would grant to each project the City's environmental approval through the issuance of an Adequacy Determination.

APPENDIX:
Level of Service

Level of service is defined in terms of average stopped delay which is determined using an analysis method relating traffic volumes, geometric conditions, and traffic control conditions. For the purpose of the LOS analysis, delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time.

Level of service criteria for unsignalized intersections have been defined as follows:

Level of Service Criteria for Unsignalized Intersections

Reserve Capacity (Passenger Car Per Hour)	Level of Service	Expected Delay to Minor Street Traffic
400	A	Little or no delay
300 – 399	B	Short traffic delays
200 – 299	C	Average traffic delays
100 – 199	D	Long traffic delays
0 – 99	E	Very long traffic delays
*	F	*

The following LOS definitions are associated with signalized intersections:

Level of Service Definitions for Signalized Intersections

LOS	Volume/ Capacity Ratio	Avg. Standing Delay Seconds/Vehicles
A	0 – 0.60	0 – 5.0
B	0.61 – 0.70	5.1 – 15.0
C	0.71 – 0.80	15.1 – 25.0
D	0.81 – 0.90	25.1 – 40.0
E	0.91 – 1.00	40.1 – 60.0
F	> 1.00	60.1 +

Source: Transportation Research Board, Special Report 209, Highway Capacity Manual, Washington, DC, 1985.